

### **Abstract of the disclosure**

An inertial sensor consisting of an electrodynamic trap for suspending one or more charged particles and a readout device for measuring variations in the position or motion of the particles when the trap is subjected to acceleration forces. Particle may be measured by optical interferometry, optical leverage, resonant electric field absorption, or by producing an image of the particle motion and processing the image data to obtain values representing the acceleration forces on the trap in one to six degrees of freedom. The electrodynamic trap employs electrodes to which a time-varying potential are applied to produce a quadupole field that constrains the charged particles to a specific location between said electrodes by a substantially linear, tunable restoring force.